CRATERS OF THE MOON (6120023)
SOURCE WATER ASSESSMENT FINAL REPORT

April 30, 2004

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This assessment is based on a land use inventory of this designated assessment area, sensitivity factors associated with the wells, and aquifer characteristics.

This report, *Source Water Assessment for Craters of the Moon (PWS #6120023)* describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

Final susceptibility scores are derived from equally weighting system construction scores, hydrologic sensitivity scores, and potential contaminant/land use scores. Therefore, a low rating in one or two categories coupled with a higher rating in other categories results in a final rating of low, moderate, or high susceptibility. With the potential contaminants associated with most urban and heavily agricultural areas, the best score a well can get is moderate. Potential contaminants are divided into four categories, inorganic contaminants (IOCs, e.g. nitrates, arsenic), volatile organic contaminants (VOCs, e.g. petroleum products), synthetic organic contaminants (SOCs, e.g. pesticides), and microbial contaminants (e.g. bacteria). As different wells can be subject to various contamination settings, separate scores are given for each type of contaminant.

The Craters of the Moon drinking water system consists of two wells. Water chemistry tests are routinely conducted on the wells of the Craters of the Moon drinking water system and have shown no significant water quality problems. Nitrate concentrations have been detected in the samples collected, but at levels far below the maximum contaminant level (MCL). No other contaminants were detected in the drinking water system. Total coliform bacteria have been detected in the distribution system at a resident's house on November 8, 1993. In terms of total susceptibility, Wells TW1 and PW2 rated moderate for IOC, VOC, SOC, and microbial contamination.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

For the Craters of the Moon, drinking water protection activities should focus on maintaining the requirements of the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity). Any spills from the potential contaminant sources listed in Table 1 of this report should be carefully monitored, as should any future development in the delineated areas. Most of the designated areas are outside the direct jurisdiction of the Craters of the Moon. Partnerships with state and local agencies and industry

groups should be established and are critical to success.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineations are near urban and residential land use areas. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. There are transportation corridors near the delineations, therefore the State Department of Transportation should be involved in protection activities. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission and Butte County Soil and Water Conservation District, and the Natural Resources Conservation Service.

A community with a fully developed drinking water protection program will incorporate many strategies. For assistance in developing protection strategies please contact the Idaho Falls Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR CRATERS OF THE MOON, ARCO, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** A map showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are attached. The list of significant potential contaminant source categories and their rankings used to develop this assessment is also attached.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess the over 2,900 public drinking water sources in Idaho for their relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area, sensitivity factors associated with the wells, and aquifer characteristics. All assessments for sources active prior to 1999 were completed by May of 2003. SWAs for sources activated post-1999 are being developed on a case-by-case basis. The resources and time available to accomplish assessments are limited. Therefore, an in-depth, site-specific investigation to identify each significant potential source of contamination for every public water system is not possible. **Therefore, this assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. DEQ recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a source water protection program should be determined by the local community based on its own needs and limitations. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The Craters of the Moon, near Arco, Idaho is located approximately 14 miles west of the town Arco. The wells are located in the northern portions of the park (Figure 1). The public drinking water system for Craters of the Moon is comprised of two wells and serves approximately 616 people through 19 connections.

Water chemistry tests are routinely conducted on the wells of the Craters of the Moon drinking water system and have shown no significant water quality problems. Nitrate concentrations have been detected in the samples collected, but at levels far below the maximum contaminant level (MCL). No other contaminants were detected in the drinking water system. Total coliform bacteria have been detected in the distribution system at a resident's house on November 8, 1993.

Defining the Zones of Contribution--Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time of travel zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer. DEQ used a refined computer model approved by the EPA in confirming the 3-year (Zone 1B) time-of-travel (TOT) for water associated with the aquifer in the vicinity of the Craters of the Moon. Due to a lack of information surrounding the source wells, DEQ was unable to model the source water protection area. The process in which the source water assessment area was determined will be discussed later in this report. The delineated source water assessment area for Craters of the Moon can best be described as a circular shaped area that extends to the northwest of the source wells approximately three miles. The actual data used by DEQ in determining the source water assessment delineation areas are available upon request.

Hydrogeology

The wells for this system are located in the USPS Craters of the Moon National Monument located approximately 14 miles west of the city of Arco in southeastern Idaho (Figure 1). The topography of the area is composed a relatively flat lava flows that form the park. The northern border of the lava flows is bound by various geologic units that outcrop to form the ridges extending to the north of the park.

The well log for Well TW1 indicates the source of the water is coming from the granitic surface located directly below the lava flows that form the USPS Craters of the Moon. The granitic rocks are an Eocene intrusive unit that has minimal surface exposure in the vicinity of the well. There is not a well log available for Well PW2, though the close vicinity of this well to Well TW1 indicate the two wells are drawing water from the same production zone. The production zone identified in the well log for Well TW1 appears to be the contact zone between the basalt and granite formations.

Generally, very few surface water features exist in the vicinity of the source wells. Several springs and minor streams flow from the northern topographic ridges towards the source wells. No streams continue to flow across the lava flows of the park. The region is arid, receiving approximately 10

inches of precipitation per year, with most of the precipitation falling in the form of snow between October and March (Weatherbase, 2004).

Due to a lack of wells in the surrounding area of the source wells, modeling the source wells was not practical. Therefore, the delineation of the capture zone for these source wells was determined by incorporating the area included in the watershed into the capture zone. The size of the area incorporated is large enough to supply the usage demands of the two wells combined.

The watershed was depicted as the capture zone due to the information provided in the well log that indicated the water was derived from the basalt/granite contact. Without wells located in the area of the source wells, model calibration for a model built to simulate this system is not possible. Therefore, the next best prediction of the capture zone for this well is upgradient of the production zone. In this case, upgradient of the production zone mimics the topography of the area as the granitic units form the ridges to the north of the source wells.

The USGS Hydrologic Unit Code delineation was used as the basis for the selection of the area included in the watershed. The entire watershed was not included in the capture zone, only the portions of the watershed that were upgradient or higher in topographic elevation than the source wells. The final area included in the delineation can be seen in Figure 2.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and from available databases.

The dominant land use outside the Craters of the Moon is undeveloped rangeland. Land use within the immediate area of the wellhead consists of undeveloped rangeland.

It is important to understand that a release may never occur from a potential source of contamination provided best management practices are used at the facility. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, such as educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A contaminant inventory of the study area was conducted during April 2004. The inventory involved identifying and documenting potential contaminant sources within the Craters of the Moon Source Water Assessment Area through the use of computer databases and Geographic Information System maps developed by DEQ. An enhanced contaminant inventory was conducted in which the system operator was given a copy of the potential contaminant inventory information to review. For the Craters of the Moon, the operator did not identify any additional sources to be included in the susceptibility rating (Table 1, Figure 2).

Four potential contaminant sites are located within the delineated source water area (Table 1, Figure 2). The sources are two gold mines, a silver mine, and a lead mine located within the 0 to 3 year time-of-travel (TOT) zone. The sanitary survey noted three bleach bottles located at the Well Junction Box, within the distribution system.

Table 1. Craters of the Moon, Potential Contaminant Inventory

SITE #	Source Description[1]	TOT Zone[2] (years)	Source of Information	Potential Contaminants[3]
1	Lead Mine	0-3	Database Search	IOC, VOC, SOC
2	Gold Mine	0-3	Database Search	IOC, VOC, SOC
3	Silver Mine	0-3	Database Search	IOC, VOC, SOC
4	Gold Mine	0-3	Development Plans	IOC, VOC, SOC

[1] UST = underground storage tank, BLM = Business Mailing List, RCRA = Resource Conservation Recovery Act,
[2] TOT = time of travel (in years) for a potential contaminant to reach the wellhead
[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Section 3. Susceptibility Analyses

The water system's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Attachment A contains the susceptibility analysis worksheets. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors: the surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone above the producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination.

Hydrologic sensitivity was high for the wells (see Table 2). This reflects the nature of the ground water being shallower than 300 feet bgs, the lack of 50 feet of cumulative thickness of low permeability units, the soils in the delineated area being classified as moderately to well drained soils, and the nature of the materials composing the vadose zone being predominately fractured basalt.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to standards, as outlined in sanitary surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced.

The Craters of the Moon drinking water system consists of two wells that extract ground water for domestic uses. The well system construction score was low for Well TW1. The low ratings are due to the well log for the well being available, a current sanitary survey being available, the thickness requirement imposed by IDWR on casing construction being met, the casing extending into a low permeability unit, the well being located outside the 100 year flood plain, and the well head being protected from surface runoff. The only category in which Well TW1 accumulated points in the system construction rating was due to the fact that the highest production zone was not less than 100

feet below the static water level.

Well PW2 rated high in terms of source construction. This high rating reflects the fact that a well log was available for this well. The lack of such information increases the overall source construction rating assigned to a well. For the 2003 sanitary survey conducted for the wells, there were five deficiencies noted. The following issues needed corrected as of October 2003: 1) three (3) bottles of Clorox brand bleach were located in the well junction box facility; 2) Small terminated downward metal pipes in the Well Junction Box facility need screens installed over the openings to ensure biological sources cannot enter; 3) the use of Clorox brand bleach is not an approved NSF product; 4) the threaded hose bibs used for fire protection should have back flow devises installed; and 5) the threaded hose bibs used a sample taps should be smoothed.

There are two ground water wells actively operating on this system. Information was only available for one of the wells, as a well log is currently unavailable for the older well of the system. The wells are located approximately 600 feet apart. Therefore, the susceptibility assessment was conducted without the existence of both well logs due to the close proximity of the two wells.

The newer well, well TW1, was drilled in October of 2000. The total depth of this well is 140 feet below ground surface (bgs). The well was constructed out of 0.380-inch thick, eight-inch diameter steel casing. The casing was set from two foot above the ground to a depth of 98 feet bgs into "granite, gravel, and silt." The well is screened from 98 to 108 feet bgs. Below 108 feet, the well is open and exposed to the formation. The surface seal was constructed out of bentonite grout pumped to a depth of 50 feet bgs. Pea gravel was poured in to the bottom of the well screen to the bottom of the casing. The static water level at the time of the development was 75 feet bgs. The well is equipped with a "Goulds" submersible pump that has a capacity of 20 gallons per minute (gpm). The location of the well can be seen in Figure 1.

The older well, well PW2, was estimated to be approximately 65 feet deep. All information related to this well was derived from the 2003 sanitary survey (DEQ, 2003). The well is equipped with a "Goulds" submersible pump that produces 10 gpm. The depth, screened interval, and construction details were not available. Due to the close proximity of this well to the older well, it was assumed that the construction and development details were similar.

The Idaho Department of Water Resources *Well Construction Standards Rules* (1993) require all PWSs to follow DEQ standards as well. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works* (1997) during construction. Table 1 of the *Recommended Standards for Water Works* (1997) states that 8-inch steel casing requires a thickness of 0.322 inches, which is less than the 0.380 inches that was used on well TW1 and possibly well PW2. The standards state that screens will be installed and have openings based on sieve analysis of the formation. Standard 3.2.4.1 requires all PWSs to have yield and drawdown tests that last "24 hours or until stabilized drawdown has continued for six hours at 1.5 times" (Recommended Standards for Water Works, 1997) the design pumping rate.

Potential Contaminant Source and Land Use

Both of the wells rated moderate for IOCs (e.g. nitrates), SOCs (e.g. pesticides), and VOCs (e.g. petroleum products). The wells rated low for microbial contamination susceptibility. The moderate ratings reflect the numerous potential contaminant sources located within the delineated area. The low

microbial rating reflects the lack of potential microbial contamination sources located within the delineated area.

Final Susceptibility Ranking

An IOC detection above a drinking water standard MCL, any detection of a VOC or SOC, or a detection of total coliform bacteria or fecal coliform bacteria at the wellhead will automatically give a high susceptibility rating to a well, despite the land use of the area, because a pathway for contamination already exists. Additionally, the storage or application of any potential contaminants within 50 feet of the wellhead will lead to an automatic high score. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0- to 3-year time-of-travel zone (Zone 1B) and much agricultural land contribute greatly to the overall ranking.

In terms of total susceptibility, Well TW1 ranked moderate for IOCs, VOCs, SOCs, and microbial contamination. These ratings are predominantly caused by the high hydrologic sensitivity and the potential contaminant sources located within the delineated area (Table 2). Well PW2 was rated high for IOCs, SOCs, and VOCs. The microbial susceptibility for this well was moderate. These ratings are due primarily to the moderate source construction rating, the high hydrologic sensitivity rating, and the potential contaminant sources located within the delineated area.

Table 2. Summary of Craters of the Moon Susceptibility Evaluation

Well	Susceptibility Scores[1]									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	Final Susceptibility Ranking			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
1	H	M	M	M	L	L	M	M	M	M
2	H	M	M	M	L	M	H	H	H	M

[1]H = High Susceptibility, M = Moderate Susceptibility, Low Susceptibility
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Susceptibility Summary

No type of contamination currently threatens the Craters of the Moon drinking water system. The wells showed a moderate or high susceptibility to IOCs, VOCs, and SOCs contamination from nearby potential contaminant sources. The wells also showed a moderate susceptibility to microbial contamination.

Section 4. Options for Drinking Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a "pristine"

area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community with a fully developed drinking water protection program will incorporate many strategies. For the Craters of the Moon, drinking water protection activities should focus on implementation of practices aimed at fulfilling the requirements of the sanitary surveys. The Craters of the Moon should also be diligent about local businesses that are regulated by the various environmental regulations (RCRA, CERCLA, SARA) or those with potential inorganic contaminants. Most of the designated areas are outside the direct jurisdiction of the Craters of the Moon. Partnerships with state and local agencies and industry groups should be established and are critical to success. Disinfection practices should be maintained to reduce the risk of microbial contamination. Continued vigilance in keeping the well protected from surface flooding can also keep the potential for contamination reduced.

Due to the time involved with the movement of ground water, wellhead protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineations are near urban and residential land use areas. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. There are transportation corridors near the delineations, therefore the State Department of Transportation should be involved in protection activities. Drinking water protection activities for agriculture should be coordinated with the Idaho Department of Agriculture, the Soil Conservation Commission and Butte County Soil and Water Conservation District, and the Natural Resources Conservation Service.

Assistance

Public water suppliers and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Idaho Falls Regional DEQ Office	(208) 528-2650
State DEQ Office	(208) 373-0502

Website: http://www.deq.state.id.us

Water suppliers serving fewer than 10,000 persons may contact Ms. Melinda Harper, Idaho Rural Water Association, at 208-343-7001 (mlharper@idahoruralwater.com) for assistance with drinking water protection (formerly wellhead protection) strategies.

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ASuperfund≅ is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

References Cited

Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 1997. "Recommended Standards for Water Works."

Idaho State Department of Agriculture, 1998. Unpublished Data.

Idaho Department of Environmental Quality, 2003. Craters of the Moon Water System Sanitary Survey.

Idaho Department of Environmental Quality, 1997. Design Standards for Public Drinking Water Systems. IDAPA 58.01.08.550.01.

Idaho Department of Water Resources, 1993. Administrative Rules of the Idaho Water Resource Board: Well Construction Standards Rules. IDAPA 37.03.09.

Weatherbase, 2003. Online climate database website at weatherbase.com.

Attachment A

Craters of the Moon Susceptibility Analysis Worksheets

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)

2) 2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.375)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Public Water System Name:	Craters of the moon
Public Water System Number:	6120023
Well Number:	TW1
Date:	4/20/2004
Person Conducting Assessment:	Dennis Owsley

SWA Susceptibility Rating Sheet

Zone IA Susceptability Rating

Warning: Due to specific conditions found in Zone IA this well has been assigned a High overall susceptability for: na

This rating is based on: (1)The presence of contaminant sources in Zone IA or (2)The detection of specific SOC/VOC chemicals in the well or (3)The detection of specific IOC chemicals above MCL levels in the well.

Public Water Systems may petition IDEQ to revise susceptibility rating based on elimination of contaminant sources or other site-specific factors.

Community and Noncommunity-Nontransient Sources	IOC Score	SOC Score	VOC Score
Hydrologic Sensitivity Score =	6	6	6
Potential Contaminant Source/Land Use Score X 0.20 =	3	3	3
Source Construction Score =	1	1	1
Total	**10**	**10**	**10**

FINAL WELL RANKING

IOC Ranking is Moderate (6 to 12 points)

SOC Ranking is Moderate (6 to 12 points)

VOC Ranking is Moderate (6 to 12 points)

Microbial Susceptability Rating	Score
Hydrologic Sensitivity Score =	6
Potential Contaminant Source/Land Use Score X 0.375 =	0
Source Construction Score =	1
Total	**7**

FINAL WELL RANKING

Microbial Ranking is Moderate (6 to 12 points)

	Public Water System Name:	Craters of the moon			
	Public Water System Number:	6120023			
	Well Number:	TW1			
	Date:	4/20/2004			
	Person Conducting Assessment:	Dennis Owsley			
	Source Construction Worksheet				
(1)	Well Drill Date	Input Date	November 1, 2000		
(2)	Well Drillers Log Available?	(•) Yes	( ) No		
				Year	
(3)	Sanitary Survey Available? If Yes, for what year?	(•) Yes	( ) No	2003	
					Value
(4)	Are current IDWR well construction standards being met?		(•) Yes ( ) No		0
(5)	Is the wellhead and surface seal maintained in good condition?		(•) Yes ( ) No		0
(6)	Do the casing and annular seal extend to a low permeability unit?		(•) Yes ( ) No		0
(7)	Is the highest production interval of the well at least 100 feet below the static water level?		( ) Yes (•) No		1
(8)	Is the well located outside the 100 year floodplain and is it protected from surface runoff?		(•) Yes ( ) No		0
		Source Construction Score =			1
	Final Source Construction Ranking =	Low Source Construction Score (0 to 1 point)			

	Public Water System Name:	Craters of the moon		Version 2.1			
	Public Water System Number:	6120023		5/19/1999			
	Well Number:	TW1					
	Date:	4/20/2004					
	Person Conducting Assessment:	Dennis Owsley					

Potential Contaminant Source/Land Use Worksheet

	Land Use/Zone IA			IOC Score	VOC Score	SOC Score	Microbial Score
(1)	Land Use (Pick the Predominant Land Type)	Rangeland, Woodland, Basalt		0	0	0	0
(2)	Is Farm Chemical Use High or Unknown? (Answer No if (1) = Urban/Commercial)	○ Yes	◉ No	**Stop: Go Directly to Step 3**			
2a	Indicate approriate chemical category	☐ IOCs ☐ VOCs ☐ SOCs		0	0	0	0
(3)	Are IOC, VOC, SOC, Microbial or Radionuclide contaminant sources Present in Zone IA? OR Have SOC/VOC contaminants been detected in the well? OR have IOC contaminants been detected above MCL levels in the well? If Yes, please check the appropriate chemical	○ Yes ☐ IOCs ☐ VOCs ☐ SOCs ☐ Microbials	◉ No				
			Land Use Subtotal	0	0	0	0

	Zone IB				IOC Score	VOC Score	SOC Score	Microbial Score
(4)	Contaminant Sources Present in Zone IB?	◉ Yes	○ No					
	Number of Sources in Zone IB in Each Category?		**# IOC Sources**	4	8	8	8	0
	(List sources by Category up to a Maximum of Four per Category)		**# VOC Sources**	4				
			# SOC Sources	4				
			# Microbial Sources	0				
(5)	Are there Sources of Class II or III Leachable Contaminants in Zone IB?	◉ Yes	○ No					
	(List Sources up to a Maximum of Four per Category)		**# IOC Sources**	4	4	4	4	0
			# VOC Sources	4				
			# SOC Sources	4				
(6)	Does a Group 1 Priority Area Intercept or Group 1 Priority Site Fall Within Zone IB?	○ Yes ☐ IOCs ☐ VOCs ☐ SOCs ☐ Microbials	◉ No		0	0	0	0
(7)	Pick the Best Description of the Amount and Type of Agricultural Land in Zone IB.	Less Than 25% Agricultural Land			0	0	0	0
			Zone IB Subtotal		12	12	12	0

Zone II

				IOC Score	VOC Score	SOC Score	Microbial Score
(9)	Are Contaminant Sources Present in Zone II?	○ Yes ◉ No	Go to Step 10				
9a	What types of chemicals?	☐ IOCs ☐ VOCs ☐ SOCs		0	0	0	0
(10)	Are there Sources of Class II or III Leachable Contaminants in Zone II?	○ Yes ◉ No	Go to Step 11				
10a	What type of contaminant?	☐ IOCs ☐ VOCs ☐ SOCs		0	0	0	0
(11)	Pick the Best Description of the Amount and Type of Agricultural Land in Zone II.	Less Than 25% Agricultural Land		0	0	0	0
		Zone II Subtotal		0	0	0	0

Zone III

				IOC Score	VOC Score	SOC Score	Microbial Score
(12)	Contaminant Sources Present in Zone III?	○ Yes ◉ No	Go to Step 13				
12a	What types of contaminant?	☐ IOCs ☐ VOCs ☐ SOCs		0	0	0	0
(13)	Are there Sources of Class II or III Leachable Contaminants in Zone III?	○ Yes ◉ No	Go to Step 14				
13a	What types of contaminants?	☐ IOCs ☐ VOCs ☐ SOCs		0	0	0	0
(14)	Is there Irrigated Agricultural Land That Occupies > 50% of Zone III?	○ Yes ◉ No		0	0	0	0
		Zone III Subtotal		0	0	0	0

	IOC Score	VOC Score	SOC Score	Microbial Score
Community and Non-Community, Non-Transient System Contaminant Source/Land Use Score	12	12	12	0

Final Community/NC-NT System Ranking

IOC Score = Moderate Contaminant/Land Use Score (11 to 20 points)

VOC Score = Moderate Contaminant/Land Use Score (11 to 20 points)

SOC Score = Moderate Contaminant/Land Use Score (11 to 20 points)

Microbial Score = Low Contaminant/Land Use Score (0 to 10 points)

	Public Water System Name:	Craters of the moon			
	Public Water System Number:	6120023			
	Well Number:	TW1			
	Date:	4/20/2004			
	Person Conducting Assessment:	Dennis Owsley			
	Hydrologic Sensitivity Worksheet				
					Value
(1)	Do the soils belong to drainage classes in the poorly drained through moderately well drained categories?		○ Yes	◉ No	2
(2)	Is the vadose zone composed predominantly of gravel, fractured rock; or is unknown?		◉ Yes	○ No	1
(3)	Is the depth to first groundwater greater than 300 feet?		○ Yes	◉ No	1
(4)	Is an aquitard present with silt/clay or sedimentary interbeds within basalt with greater than 50 feet cumulative thickness?		○ Yes	◉ No	2
			Hydrologic Sensitivity Score =		**6**
	Final Hydrologic Sensitivity Ranking =	High Hydrologic Sensitivity Score (5 to 6 points)			

Public Water System Name:	Craters of the moon
Public Water System Number:	6120023
Well Number:	PW2
Date:	4/20/2004
Person Conducting Assessment:	Dennis Owsley

SWA Susceptibility Rating Sheet

Zone IA Susceptability Rating

Warning: Due to specific conditions found in Zone IA this well has been assigned a High overall susceptability for: na

This rating is based on: (1)The presence of contaminant sources in Zone IA or (2)The detection of specific SOC/VOC chemicals in the well or (3)The detection of specific IOC chemicals above MCL levels in the well.

Public Water Systems may petition IDEQ to revise susceptibility rating based on elimination of contaminant sources or other site-specific factors.

Community and Noncommunity-Nontransient Sources	**IOC Score**	**SOC Score**	**VOC Score**
Hydrologic Sensitivity Score =	6	6	6
Potential Contaminant Source/Land Use Score X 0.20 =	3	3	3
Source Construction Score =	4	4	4
Total	**13**	**13**	**13**

FINAL WELL RANKING

IOC Ranking is High (13 to 18 points)

SOC Ranking is High (13 to 18 points)

VOC Ranking is High (13 to 18 points)

(5)	Is the wellhead and surface seal maintained in good condition?	(●) Yes ( ) No	0
(6)	Do the casing and annular seal extend to a low permeability unit?	( ) Yes (●) No	2
(7)	Is the highest production interval of the well at least 100 feet below the static water level?	( ) Yes (●) No	1
(8)	Is the well located outside the 100 year floodplain and is it protected from surface runoff?	(●) Yes ( ) No	0
		Source Construction Score =	**4**
	Final Source Construction Ranking =	Moderate Source Construction Score (2 to 4 points)	

	Public Water System Name:	Craters of the moon				Version 2.1			
	Public Water System Number:	6120023				5/19/1999			
	Well Number:	PW2							
	Date:	4/20/2004							
	Person Conducting Assessment:	Dennis Owsley							

Potential Contaminant Source/Land Use Worksheet

	Land Use/Zone IA				IOC Score	VOC Score	SOC Score	Microbial Score
(1)	Land Use (Pick the Predominant Land Type)	Rangeland, Woodland, Basalt			0	0	0	0
(2)	Is Farm Chemical Use High or Unknown? (Answer No if (1) = Urban/Commercial)	○ Yes	◉ No		**Stop: Go Directly to Step 3**			
2a	Indicate approriate chemical category	☐ IOCs ☐ VOCs ☐ SOCs			0	0	0	0
(3)	Are IOC, VOC, SOC, Microbial or Radionuclide contaminant sources Present in Zone IA? OR Have SOC/VOC contaminants been detected in the well? OR have IOC contaminants been detected above MCL levels in the well? If Yes, please check the appropriate chemical	○ Yes	◉ No	☐ IOCs ☐ VOCs ☐ SOCs ☐ Microbials				
				Land Use Subtotal	0	0	0	0

	Zone IB					IOC Score	VOC Score	SOC Score	Microbial Score
(4)	Contaminant Sources Present in Zone IB?	◉ Yes	○ No						
	Number of Sources in Zone IB in Each Category?		**# IOC Sources**	4		8	8	8	0
	(List sources by Category up to a Maximum of Four per Category)		**# VOC Sources**	4					
			# SOC Sources	4					
			# Microbial Sources	0					
(5)	Are there Sources of Class II or III Leachable Contaminants in Zone IB?	◉ Yes	○ No			IOC Score	VOC Score	SOC Score	Microbial Score
	(List Sources up to a Maximum of Four per Category)		**# IOC Sources**	4		4	4	4	0
			# VOC Sources	4					
			# SOC Sources	4					
(6)	Does a Group 1 Priority Area Intercept or Group 1 Priority Site Fall Within Zone IB?	○ Yes	◉ No	☐ IOCs ☐ VOCs ☐ SOCs ☐ Microbials		0	0	0	0
(7)	Pick the Best Description of the Amount and Type of Agricultural Land in Zone IB.	Less Than 25% Agricultural Land				0	0	0	0
				Zone IB Subtotal		12	12	12	0

Zone II

				IOC Score	VOC Score	SOC Score	Microbial Score
(9)	Are Contaminant Sources Present in Zone II?	○ Yes ◉ No	Go to Step 10				
9a	What types of chemicals?	☐ IOCs ☐ VOCs ☐ SOCs		0	0	0	0
(10)	Are there Sources of Class II or III Leachable Contaminants in Zone II?	○ Yes ◉ No	Go to Step 11				
10a	What type of contaminant?	☐ IOCs ☐ VOCs ☐ SOCs		0	0	0	0
(11)	Pick the Best Description of the Amount and Type of Agricultural Land in Zone II.	Less Than 25% Agricultural Land		0	0	0	0
		Zone II Subtotal		0	0	0	0

Zone III

				IOC Score	VOC Score	SOC Score	Microbial Score
(12)	Contaminant Sources Present in Zone III?	○ Yes ◉ No	Go to Step 13				
12a	What types of contaminant?	☐ IOCs ☐ VOCs ☐ SOCs		0	0	0	0
(13)	Are there Sources of Class II or III Leachable Contaminants in Zone III?	○ Yes ◉ No	Go to Step 14				
13a	What types of contaminants?	☐ IOCs ☐ VOCs ☐ SOCs		0	0	0	0
(14)	Is there Irrigated Agricultural Land That Occupies > 50% of Zone III?	○ Yes ◉ No		0	0	0	0
		Zone III Subtotal		0	0	0	0

	IOC Score	VOC Score	SOC Score	Microbial Score
Community and Non-Community, Non-Transient System Contaminant Source/Land Use Score	12	12	12	0

Final Community/NC-NT System Ranking

IOC Score = Moderate Contaminant/Land Use Score (11 to 20 points)

VOC Score = Moderate Contaminant/Land Use Score (11 to 20 points)

SOC Score = Moderate Contaminant/Land Use Score (11 to 20 points)

Microbial Score = Low Contaminant/Land Use Score (0 to 10 points)

	Public Water System Name:	Craters of the moon			
	Public Water System Number:	6120023			
	Well Number:	PW2			
	Date:	4/20/2004			
	Person Conducting Assessment:	Dennis Owsley			
	Hydrologic Sensitivity Worksheet				
					Value
(1)	Do the soils belong to drainage classes in the poorly drained through moderately well drained categories?		○ Yes	◉ No	2
(2)	Is the vadose zone composed predominantly of gravel, fractured rock; or is unknown?		◉ Yes	○ No	1
(3)	Is the depth to first groundwater greater than 300 feet?		○ Yes	◉ No	1
(4)	Is an aquitard present with silt/clay or sedimentary interbeds within basalt with greater than 50 feet cumulative thickness?		○ Yes	◉ No	2
			Hydrologic Sensitivity Score =		**6**
	Final Hydrologic Sensitivity Ranking =	High Hydrologic Sensitivity Score (5 to 6 points)			